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[SUPPLEMENT.]

GEOLOGICAL SURVEY OF THE CARN MENELIS DISTRICT, CORNWALL.

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[From the Mining Review.]

Cornwall, perhaps, affords as interesting a field for the researches of the geologist as any spot on the globe, as it consists of a succession of ranges of granite hills, surrounded with a great variety of primitive, slaty, and other rocks, of which a great length of section is open to view in the extensive cliffs on the coast and shores of the harbours and creeks by which it is so deeply intersected, while the interior of the country being so deeply explored by the operations of mining, and numerous quarries of stone being laid open, and the whole of the formations being on comparatively so contracted a scale, afford opportunity, within a narrow compass, of observing the various successions of what are called primitive rocks.

Having long ago arrived at the conclusion, that many of the formations that I have observed have never been accounted for in a satisfactory way by any geologist, I have given up the idea of being able to assist in supporting any theory that I have ever heard of; therefore, my survey has not been grounded on any such hope, it being undertaken for the purpose of showing the extents of the various formations, as far as I could discover them, and for collecting specimens from the several rocks, which the more scientific geologist may be able to make a better use of than I can.

For the purpose of arranging my observations, I have divided the county into several districts; the one I am now describing, I have called, as before stated, the Carn Menelis district, because this hill is the highest ground within it, and is not far from its centre. This district is partly bounded by the northern and southern coasts, and extends from Falmouth Harbour on the east to the mouth of Hayle Haven on the west. In describing its boundary, we may begin at Truro, and proceed southward down the navigable river through Falmouth Harbour, and along the coast to Helford Haven, then westward through that inlet to Gweek, and continue up the stream to Helston Downs, and from thence south-westward to another stream, and along that stream to where it falls into the eastern branch of the Loe, and from thence across Loe Bar, and along the coast to Porthleven. From Porthleven northwards up the stream between Breage and Sithney, and from the head of the stream north-westward to Binner Downs, and down the stream on the west of Gwinear to Hayle Copper-house, and from thence westward down the creek and through the mouth of Hayle Haven, and from thence north-eastward along the coast to Perran Porth, and from that place up the stream south-eastward by Boleing to Perran Alms-house, and down the southern stream by Edles to Truro. It will be seen that this district takes in parts of the four western hundreds. It occupies 189 7-10 square miles, of which 51½ are granite, and the remainder principally slate. The granite formation is intersected by the slate, so as to divide two small portions from the remainder; and I distinguish these as the Carn Brea range and the Carn Marth range. The former extends from Redruth Church westward to Pendarves, about three and a half miles long, and takes in the hills of Carn Brea, Carn Tregajorran, Carn Arthen, Carn Entral, and Camborne Beacon, and is divided from the main formation by a breadth of slate (principally micaceous) from a quarter to half a mile wide. The Carn Marth range takes in the hill of that name and Trefula Beacon, and is divided from the main granite by slate at Wheal Beauchamp.

Carn Brea range occupies one and one-fifth square miles, and Carn Marth range two and one-fifth square miles; all the remainder may be called Carn Menelis range.

At Cligger Head, near the northern extremity of the district, is also a small formation of granite, occupying about ten acres of the outer part of the promontory. The district may be described generally as a range of granite hills, surrounded by slate of various descriptions, which slate is in some places interspersed with masses of greenstone, and both the granite and slate traversed by a great number of elvan courses, metallic veins or lodes, cross-crosses and slides, and the lodes abounding most in copper and tin near the junction of the granite and slate. In general, the relative positions of the rocks are:—First, the granite, which may be said to form the nucleus round which the other rocks are arranged; next, micaceous slate, then clay, which is intersected by masses of greenstone and hornblende rock; and, lastly, a soft, grey, sandy slate, which has been called grawacke by some geologists; but which, according to my humble view of the formation, may be as much a primitive slate as any of the others, as at the junction with the clay slate the two sorts are in alternate stratification, and it appears to be a regularly formed aggregate of clay and minute particles of quartz, and does not contain any imbedded matters.

Whether the slate be of contemporaneous formation with the granite may admit of dispute; but as it appears that at their junction the slate is traversed by granitic veins or floors, and the granite by veins of schist, and that in some places the two sorts appear to be in alternate stratification,* it may be difficult to show how they can be other than of contemporaneous formation. However this may be (as I have before noted in my survey of the mining district), it appears that they must have been in their present relative positions at the time the elvan courses, and other lodes and courses, were formed, as these traverse the two formations without interruption. As the granite and schist alternate at their junction, so also do the various sorts of slate; and the cliffs and quarries about Falmouth, the ground at Truro, the cliffs at Mawnan, and other places, present alternations of blue clay slate, with grey sandy slate, as before mentioned.

The hills in the granitic formation are principally of a rounded form, and are much higher than the slate ground round them, as may be seen by the geological elevations accompanying the map; their elevations above the sea are from 400 to about 800 feet; the highest spot, as before stated, in Carn Menelis, the elevation of which is 830 feet. Many rocks which have been dislodged from their original position, are scattered about on the tops and sides of some of the hills; and in the valleys and in many places cover great parts of the surface, and are also found in great quantities imbedded in the alluvial deposit, rounded, as if they had long been subject to the action of the atmosphere, before they were dislodged from their position on the hills, or before they were surrounded by alluvial matter. Only the hill which forms Carn Brea and Carn Tregajorran, has any appearance of mountainous ruggedness, although there are some picturesque masses here and there: the most remarkable of which are, Mayne Rock in Constantine, Mayne Amber in Crowan, and Black Rock in the same parish. Most of these masses, or crans, appear to remain in their original position, as if they had formed parts of the hills of which the surrounding softer parts had been worn away or disjointed, loosened and rolled down the hill; and the angles of the fissures, owing to the granular texture of the stone, having been rounded by the action of the atmosphere, the rocks in many places present the appearance of elliptical-shaped stones, piled one on another. The granitic rocks are of various descriptions, but nearly all of a grey colour, composed of white felspar, quartz, and mica, principally coarse-grained, and of various degrees of hardness, some of it quite decomposed,† and in some places the felspar crystals are very large. The mass is traversed by veins of very hard, ponderous, small-grained granite; these veins are of various sizes, from one and two feet to less than an inch thick.

Some of the granitic rocks contain much schorl. A beautiful specimen of red felspar and schorl I found on Carn Brea, but whether it came from a mass or a vein I could not discover. In many places, to the depth of a few feet only, the granite appears as if stratified, from its having numerous fissures, which are usually parallel to the surface, whatever the inclination of that surface may be.

* A very fine section of granitic veins traversing the slate may be seen near the cliffs at Tremearne in Breage.

† Whether the term decomposed is proper, may be doubtful, as the granitic matter may never have been harder than it now is.

The highest point of the slate ground is St. Agnes Beacon (634 feet above the sea); but this hill is an exception to the general formation, as it stands high above all the surrounding land, and is peaked like some of the granite hills; no other slate hill rises so high, or is shaped like it. The surrounding slate country, as viewed from the higher granite hills, presents the general appearance of an undulating surface, intersected by numerous yellow valleys.

The slate, as before stated, consists of the various sorts usually found in what are called primitive formations, and their stratification all round the granite, and extending to the distance of two or three miles, dip in a general direction from the granite at various inclinations; and these inclinations do not appear to be governed either by the inclination of the face of the granite, or by their distance from it, nor to correspond in any way with the surface of ground or the contour of the hills, nor do they appear to be governed by any known circumstance.

Greenstone masses, apparently without regular formation, intersect the slate, generally at no great distance from the granite. I have found these masses extending along the north-east border of Carn Menelis range, from the neighbourhood of Penryn to near Tresavean Mine; along the north-west borders of the Carn Marth and Carn Brea ranges from Treskerby Mine to Camborne, and extending further westward through Gwinear, and some masses here and there along the westward and south-west border of the Carn Menelis range.

In some places the greenstone protrudes through the surface, forming picturesque masses like many parts of the granite formation; and as the outer part of these rocks are discoloured by the action of the atmosphere, they cannot be distinguished from granite except by a near inspection. The greenstone is almost all composed of hornblende and quartz.

Elvan courses are very numerous, of various breadths, from a few feet to fifty or sixty fathoms, and chiefly range about west-south-west and east-south-east, and generally incline greatly from the perpendicular. They pass through both the granite and slate, and are found throughout the granite formation. They are mostly of porphyritic stone, appearing to be composed of felspar, with felspar crystals, quartz crystals, and spots of hornblende; some of them contain mica, others have so much hornblende in their composition, that they may be almost said to be a sort of greenstone, and some of them so much of minute particles of quartz as to form a sort of hornstone. It may not be easy to determine whether these courses are not of contemporaneous formation with the adjoining granite and slate, as in some places the junction appears to lead to such supposition, and the great breadth they occupy in the formations in which they abound, also countenance such an idea. In some specimens taken from elvan courses, I have accidentally noticed that some of the minute veins of quartz and schorl with which they are traversed, pass through the crystals of quartz and felspar, and the like occurs in the granite; and in one specimen of elvan, I find spots of hornblende in the felspar crystals.

A course of soft stone (apparently felspar and mica) ranges about north-north-east and south-south-west, through the parish of Kenwyn, and passes into the adjoining district. It appears to dip east about twenty degrees. Many pits are open on it, as great quantities of it are carried off for manure. A course of the same sort may be seen in the cliff east of Pill Creek, from whence it appears to pass north-eastward, and through the cliff opposite to Trellisick, and may be further seen in the shore under Trellisick, and again passing out through the cliff northwards to King Harry Passage, and in the cliff at Tolvenne Passage. The general range of the course appears to correspond in direction nearly with that which traverses the parish of Kenwyn. It may be difficult to say whether these courses should be considered as veins or strata, as their dips or underlays conform to those of the adjoining slate.

The earthy matter and rubble which cover the solid rock (which is itself covered with vegetable soil) has, I believe, been called by geologists *diurnal matter*; but it does not appear that such term can be properly applicable to this formation in Cornwall, as in general it appears, particularly on the schist, to be nothing more than an extension upwards of the stone itself, in a shattered or decomposed state, getting gradually in smaller pieces and more earthy as it approaches the surface; although here and there, according to the particular positions of the ground, some diurnal matter, from the decomposition of the higher grounds, has been washed down on the lower; and this is particularly the case on the declivities of the granite hills, and the lower grounds bordering on them.

Now, there may appear no difficulty in accounting for the decomposed and shattered state of the solid rock, which may be supposed to have taken place from the action of the rains or other waters and changes of temperature; but there is a peculiarity attending the formation which cannot be so accounted for. In the sides of many hills, the shattered top of the slate bends over towards the lower ground, and this it does whatever may be the inclination of the strata of the solid rock, so that on one side of a valley the shattered top will be found bent, so as only to have a less dip than the solid strata, while on the opposite side it will be bent over so as to have a dip in the contrary direction to the rock. This may be best elucidated by the section below, which shows two quarries now open in the moor at Falmouth; the left-hand quarry being behind Berkeley Place, and the other behind the Classical School. Some time ago a good section of the left-hand quarry was open, and probably still continues so.



After my attention was drawn to this circumstance, I observed others of such formations; but after a while, from seeing so many, I ceased to take particular notice of them.

On the southern coast of this district, the beaches are formed of the various broken stones from the rocks and cliffs, consisting principally of quartz, and the harder parts of the slate, which have been more or less rounded by the attraction caused by the action of the waves, and form pebbles, gravel, and sand; while the finer particles, which the motion of the sea will not suffer to rest where the tide is constantly acting, are finally deposited beyond the ordinary low water mark, and there form a fine sandy flat, which is usually uncovered at the low veers of spring tides; and in many places broken sea-shells get mixed with it to so great a degree, as to form a calcareous manure, much of which is taken away for such purpose.

The beaches of the northern coast, although they are here and there (according to their particular positions as to the action of the sea) formed of the broken pieces of the rocks and cliffs, yet for the most part consist of broken sea-shells, forming a fine sand of yellowish white appearance. The vast and apparently constant accumulation of this sand in all the places where the projecting headlands form bays or gulphs facing to the west, and, consequently, open to the direct roll from the Atlantic Ocean,

* In my report on the "survey of the mining district," it was stated that in Coisgarne Downs, there appeared to be a mass of elvan; but I have reason to think that this must have been a mistake. The information I received at the time of making that survey was, that in "the United Mines" workings, the elvan was found in irregular masses, and abounded throughout. In my subsequent examination of the neighbouring ground, I have been led to believe that all the elvan is in irregular courses, and that the mistake arose from these courses ranging obliquely to the metallic lodes, and dipping at different inclinations, so that in the mining drifts and shafts the elvan would appear without regularity, unless the ranges and dips of the courses had been previously known.

occasion, in such positions all along the coast, the formation of these towns or sand-hills which cover some thousands of acres of ground, and furnish an inexhaustible store of calcareous manure, vast quantities of which are daily carried off to the neighbouring country, some to the distance of twelve or thirteen miles. In some places the heights of the cliffs may have prevented the sand from surmounting them, but where in such situations the cliffs are low, the sands have covered them, having first, by their accumulation, formed a slope of easy ascent, over which succeeding sands have been wafted and have extended inland, and, without doubt, in some places have buried tracts of good soil; nevertheless, these sands are very superior in value to the public to all the grounds that have been overwhelmed by them. Although, from the lightness of the particles, these sands are constantly liable to be shifted in some degree by every strong wind, yet it appears that sometimes many years elapse without much fresh sands being blown over the Towns; at least, this must partially happen, as the surface has been left to rest long enough for grass and other vegetables to grow, get to a firm surface, and collect a blackish mould, which must have taken many years to form; and this has repeatedly happened on the same spot, as on opening the ground in many places, several layers of mould may be seen at various intervals, showing the depth of sand that had accumulated between each time of rest. In some places the sands have been indurated, and form a hard stone. Probably this has taken place while the component parts were deeply buried, and lay undisturbed. Chemists probably may decide whether, in such position, the calcareous matter might be dissolved by water, which may contain some solvent, collected from vegetable matter, at the surface or otherwise, and thus form an agglutinating cement to consolidate the sand, and in time convert the sand-hills into masses of limestone.

In my earlier days of geological research, I endeavoured to reconcile the various formations I observed to some one of the theories which have been promulgated; but my humble attainments in science did not help me in making out how it could have been brought about, that the various sorts of rocks alternate with each other, and in what way the granite and schist at their junctions form veins of all sizes, penetrating each into the other, and traversing for a great length, and branching into numerous ramifications, horizontal, vertical, and at various inclinations. These, and other circumstances,† which, day after day, came under my notice, led me, as before stated, to abandon all hopes of being able to assist in supporting any theory, and to turn my attention merely to collect as much information as I could afford time to do. For this purpose I have traversed the country in all directions, and have coasted round the headlands, and cliffs, and shores of the harbours and creeks, as far as I had opportunity of doing so; yet there are many parts that require more examination, for it cannot be considered that the survey is complete, until every bare rock, quarry, and cliff, shall have been looked at; particularly the junctions of the different formations, the elvan courses with the enclosing rocks,‡ the alternations of strata of various rocks, the heaves or dislocations,§ and the curious contortions.¶

* The ancient parish church of Gwilt, which had been for a long time overwhelmed and lost, was re-discovered a few years ago, after a storm had uncovered the spot. About thirty years ago the church of Perran Zabulo was removed from Perran Sands to the spot where it now stands, but not until the sands on its northern side had advanced nearly to the top of the walls. This building is said to have stood 700 years; previous to which another church stood half a mile north-west of that spot, on the other side of a narrow valley, through which ran a stream. Some of the ruins of this most ancient church were lately to be seen, at times when the sands moved in particular directions, as also the bones and parts of skeletons of people who were buried there; so that it appears that the bodies were continued to be deposited in the sand after the church-yard had been covered for some depth. Within the last twenty or thirty years, four ancient barrows have been uncovered in Perran Towns, by taking away the sand for manure.

† I have observed in this district two curious divisions in the slate formation: one of them is the cliff at Phillack Sands, where an irregular mass of green-stone schist overlies a regular stratified slate, which dips south forty degrees, as shown in the annexed section; the other a quarry, near Mithian Barrow, in St. Agnes, where a slide, varying from six to twenty-four inches thick, divides an irregularly stratified clay slate, which is over it, from a grey flinty slate. The dip of the slide is about south-east thirty degrees; the stratification of the flinty slate is nearly horizontal, as shown in the annexed sketch.



In the cliffs a little north of Porth Towan, a curious vein of slate traverses the killas ground; this vein is bent, as shown in the annexed sketch, is about ten feet wide and about fifty feet high. The strata of the vein throughout is parallel to its inclination; the strata of the surrounding ground is nearly horizontal.



‡ The cliffs of the northern coast present fine sections for examination, but they require, in most places, to be visited in a boat; consequently, they are often not accessible for weeks together, owing to the surf.



§ I examined particularly a course near Helston. The southern side of the course was open, and dipped south fifty degrees. On this side, for about four feet wide, adjoining the overlying slate, the elvan is slaty, and stratified parallel to the dip of the course. There is a distinct line of division between the slaty and amorphous elvan, but the division between the slaty elvan and the slate is not well defined, but appears passing into each other; the dip of the adjoining slate is parallel to the dip of the course.



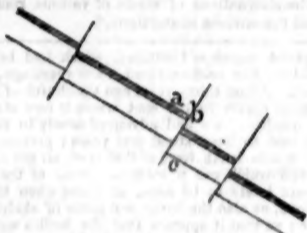
Whatever evidence there may be in support of the hypothesis that the granite was protruded through the slate from below, or that the lodes and courses were filled by injection, sublimation, or other ways, from the central parts of the earth, nothing in Cornwall (according to my humble view) appears to support such opinion. Had the granite been protruded in such way, many masses of slate through which it penetrated would have been found resting on the granite, and detached from the main body, and in some of the hollows the slate would have been found occupying the spaces between the granite hills, for it cannot be supposed that the whole of such has since been swept away; besides, the protrusion of the granite, by displacing the neighbouring slate, would have thrown it into all sorts of irregular formations, and the strata, consequently, would there have been irregular, disjointed, split, and rent, and dipping in all directions. But nothing of the sort is to be seen; for the granite, together with its overlying schist, form regular surfaces, the schist lying compact and firm on the face of the granite, so that there is no means of discovering where the junction is, but by uncovering the rocks. These facts, together with what has been stated about the intersection of granite and schist, appear to me to render it very difficult to support any known theory of the manner in which they have been formed. Again, if the matter of the elvan courses or lodes had been projected from below, how comes it that in no places does it overflow? Surely all the matter that might have been projected in such way, would not have been so nicely adapted to the hollow chasms so exactly to fill it to the surface, as it is found to do; some of it would have overflowed and spread right and left over the adjoining rock, and have formed huge masses; and among the hard rocks of these courses, whatever might have been the amount of wear of surface since their formation, many of them would have been found piled in rugged masses, like the harder granite rocks. In some places the matter would not have reached the surface, but have left open chasms of various depths, which would have been filled with whatever might have rolled in from the top; which parts in such cases would have formed courses of stones and earthy matter of all sorts, and would, in fact, be courses of diluvial matter; but such courses have never yet been discovered, although the ground has,

been examined another course, near Tresamble. The northern side was open, and dipped north about thirty degrees. The division between the elvan and slate not regular but uneven, and the elvan in some places projecting in veins into the slate. Near the division, for a few feet wide, the elvan is fissured parallel to the line of division, but in the interior the fissures are horizontal. The surrounding slate is horizontally stratified, but close to the elvan the strata conform to the dip of the elvan course.

Many heaves are observed in the mines where cross-courses are met with, and which are particularly noticed in my survey of the mining district. The most remarkable of those which I have observed in the cliffs and rocks in this district, are one near Swanpool, where, at twenty fathoms east of the cliff, the elvan course is near three fathoms to the right by a small cross-course; the appearance of the rock on both sides of the cross-course is firm, and shows nothing like any disorder that might attend such dislocation.

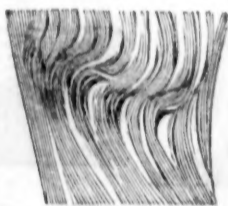


The other heave (or rather heaves, for there are three) is at Mawnan, where, on the beach close to the cliff, a course of grey micaceous stone (a) is above at (b), ten feet to the right; six fathoms east of which is another heave, twelve feet to the right, and twenty fathoms west of the first-mentioned heave is another of five feet to the right, as shown in the annexed plan. At

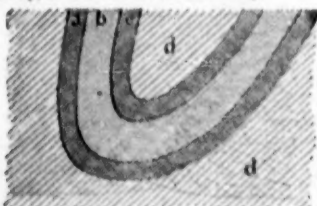


b, eight feet south of course a, is another course c, parallel to it, but owing to the state of tide I did not follow up this course.

In the cliff near Port Sausen, in Mawnan, where the slates are in alternate strata, there is a contorted formation, as in the opposite section, about twelve feet wide; about seventy fathoms east of which is another curious formation. In an irregular large course of soft stone A, are three wavy veins (a b c) of hard micaceous stone; a and b are each two inches thick, and are one foot asunder; c is two feet from b, and is eight inches thick. At B the stratification of the slate is regular, but the alternations (hard and soft) are across the dip of the strata. In the cliff west of Durgan the slate alternates in the same way, and in the cliff at Gwithian.



I shall here mention two formations more, which, although they are not within the district, are very near to it. One of them is in the cliff on the southern side of Helford Harbour. The annexed section shows three courses of stone, a, b, and c; a is about one and a half foot wide, b about three and a half feet wide, and c about one and a half foot wide; although the mineralogical construction of the slate ground d, and the three courses, are all different, yet the dip of their strata is all alike, and has no reference to the curvature. The strata dip south sixty degrees, but, as the section is obliquely across the dip, it does not show the true dip.



The other formation is in the cliff at Gunwalloe, south-east of Penzance cliffs, as in the section below. A is a slate dip east-south-east forty degrees; B a mass of irregular slate, about eight fathoms in extent; C alternate stripes or strata of slate and greenstone, each from a few inches to one foot wide, about twenty-two fathoms in extent; D is also alternate stripes of greenstone and slate, the greenstone strata from six inches to two feet wide, and the slate from a few inches to one foot wide, about ten fathoms in extent; E slate dips east forty-five degrees.



where lodes and courses most abound, been so much penetrated by the miner.

Probably a great deal remains to be known, before scientific men may be able to make out a satisfactory theory of the formation of primitive rocks; perhaps some powerful causes may be in action that are not yet discovered, or such causes having been put in operation by the Almighty Creator to bring about certain results, may have ceased to act in our globe, because they are no longer required.

Whatever mode of formation, convulsion, or deposition, may have placed the rocks in their present relative positions, such operations must have been previous to the opening of the fissures in which are contained the lodes and courses, as these pass uninterruptedly through the several rocks at their junction; and it may be presumed that the primitive masses, with their lodes, courses, and veins (in this district), all existed in their present state before the earth was clothed with vegetation, or was made a fit abode for animals; and possibly before its movements in the grand scale of the solar system were regulated, as they are now; and while it was "without form, and void," and before the waters were "gathered together," and formed seas; and in which time the waters might have been continually or occasionally in rapid motion, and with resistless torrent scooping out the hollows that now form the valleys, tearing away the surfaces of the formations, and eventually lodging them in the lower places; thus the denser parts might not be far removed, while the lighter matters might much of them be suspended for a great length of time, and finally be deposited at the bottom of the sea. That operations of this kind may have brought the surface of the earth to its present state, is countenanced by the deposits of tin in the depths of the valleys, which, with its associate stone, form beds on the bare rocks, and which, after those deluges had ceased to act, became covered with alluvial matter, brought down by rains and torrents, as we find them to be; by the appearance of the denuded mass, and blocks of granite and greenstone lying about the tops and sides of the hills, and in the neighbouring valleys, which may be remains of formations that extended to a much higher elevation than they now do; by the stratification of the slate having no relation to the contour of the surface; and by the covering now existing on the rocks, as already described; and by the quantities of rounded stones or pebbles deposited below the soil on high situations in this and other districts; and which stones must have long been subject to attrition, before they were left quiet by the retiring of the waters.

PROCEEDINGS OF SCIENTIFIC MEETINGS.

ROYAL GEOGRAPHICAL SOCIETY.—Nov. 14.

Sir JOHN BARROW, President, in the chair.

This being the first meeting for the season, several new members, including Lord Yarborough, Vice-Admiral Sir John P. Beresford, Captain the Hon. Dudley Pelham, and ten others, were proposed for election. Baron Charles Hügel, of Vienna, and Count Gräberg de Hemsö, were elected Foreign Honorary Members; and a long list of donations was announced, many of them very valuable.

Extracts from several papers were read:—

1st.—Sketch of the surveying voyages of H. M. S. *Adventure* and *Beagle*, from 1825 to 1836, by Captain R. Fitz-Roy, R.N. Of the former part of this survey, viz. that of Tierra del Fuego, and the south-western coast of Patagonia, by Captain P. P. King, an account was laid before the public in the year 1831. Resuming the survey in the autumn of that year, Captain Fitz-Roy commenced with the right or southern bank of the wide Rio de la Plata; every mile of the coast thence to Cape Horn was closely surveyed and laid down on a large scale. Each harbour and anchorage was planned, thirty miles of the Rio Negro, and two hundred of the river Santa Cruz, were examined, and a chart was made of the Falkland Islands, to the westward of Cape Horn, from the 47th degree of south latitude, as far as the river Guayaquil, a distance of more than 3000 geographical miles; the whole coast of Chile and Peru have been surveyed—no part or roadside has been omitted. "Traced copies," says Captain Fitz-Roy, "of the charts of coasts adjacent to Buenos Ayres, of the whole coast of Chile, and of the greater part of the shores of Peru, were given to the respective governments of those countries before our vessels left their territories, and long before the original documents could reach England." This is, we believe, an instance of liberality without parallel in the whole annals of maritime survey or discovery. From South America the *Beagle* hastened to that classical spot, Otaheite, thence to New Zealand, Sydney, Hobart Town, King George's Sound, Keeling Islands, Mauritius, Cape of Good Hope, St. Helena, Ascension, Bahia (in Brazil), Pernambuco, Cape Verde Islands, Azores, and arrived at Plymouth in the beginning of October, having completed a very valuable chain of chronometric measurements, the result of twenty-two chronometers, for the entire circuit of the globe. In the course of these five years much interesting information relating to the Patagonians, the natives of Tierra del Fuego, (three of whom returned to their native country from England on board the *Beagle*), of the Galapagos Islands, of Otaheite, &c., was obtained, for which we have not space; yet the following extract must find room:—"What a fertile country is the northern island of New Zealand; and how fast the character of that land and its inhabitants is changing! An Englishman may now walk alone and unmolested about any part of the northern island, where, ten years ago, such an attempt would have been a rash braving of the club and the oven. English and American houses are scattered near the Bay of Islands, and settlers are rapidly increasing. All this is chiefly due to the Church Missionary Society. Nothing could be more gratifying than the view of a flourishing agricultural settlement, with good farm-houses, barns, water-mill, mechanics' shops, and large gardens, in the interior of the northern island. I was astonished at what I saw; and when a New Zealander came out of the mill, powdered with flour, and carrying a sack of corn upon his back, I could hardly believe my own eyes." We hope ere long to see this highly interesting voyage announced for publication.

2ndy.—Extracts from a journey to the Himaláhe Mountains, and to the valley of Kashmir, in the spring of 1836, by Baron Charles Hügel, of Vienna, an eminent naturalist, who has spent nearly six years in travelling, chiefly in India. He says that Kashmir, in a political and financial point of view, has been much over-rated—not in a picturesque one. The valley is about eighty miles long, its breadth varying from thirty miles to six, that is, its actual plains; from the eternal snow of the Pir Panjahl to the Tibet Panjahl, is from fifty to sixty miles, the highest part of the Pir Panjahl 15,000 feet. The population of Kashmir four years ago was 800,000, now not exceeding 200,000 persons: the town contains 40,000. Its revenue last year nearly nothing: this year Runjit Singh demands twenty-three lakhs, which the country cannot pay.

3rdly.—The most recent accounts from Australia, noticing the departure of another exploring expedition, under Major Mitchell, to trace the river Darling to its supposed junction with the Murray, and also giving the report of the party sent to search for the late colonial botanist, Mr. Cunningham, who, it will be remembered, strayed from the former expedition. The party succeeded in finding the tribe who had murdered him, and in making prisoners of the murderers; they also found his bones, which they buried, and erecting a mound over them, thus no

* It has been already shown in what manner the rocks are covered by the extension upwards of the stone in a shattered or decomposed state; and in this covering are to be traced, in the same way, the extension upwards of the matter of the lodes and courses, as in the section below.



† I am not aware whether attention has been drawn to those veins which appear to be of contemporaneous formation with the enclosing rock; such veins, I presume, would not pass into an adjoining formation.

‡ No traces of animal or vegetable matter are to be found in any of the lodes or courses.

§ Miners generally find the ground softer under the valleys than under the hills.

|| On Crowaw Downs, in the parish of St. Keverne, in Menage district, immense quantities of pebbles are deposited in the matter covering the rocks, as well as on a hill north-west of Mayne-ambre in Crowan.

doubt remains that Mr. Cunningham has fallen a victim to his zeal in his favourite pursuits.

4thly.—A letter from Mr. Davidson, dated Wednesbury, July 14, in which he states various causes of the delay incurred in prosecuting his journey to Timbuctoo, viz. that the great Caffah, from Soudán, had been attacked, thirteen persons killed, and many slaves set at liberty; that war raged in Bambara, &c.; but that, in spite of all these obstacles, he had engaged guides, and hoped by the 1st of October to have actually started on his journey to Timbuctoo. He and Abú Bekr, his travelling companion, were quite well. The Sheikh Beyrook, whose influence is all-powerful in that district, had been very civil to him; and we hear that a present of various trifling articles of our manufacture left England on the 14th instant, to ensure his friendly disposition towards Mr. Davidson.

5thly.—A letter from Mr. Schomburgk, dated Sept. 2, George Town, Demerara, announcing that he had that day started on his second expedition into the interior of British Guayana, intended to ascend the river Courantín, (the eastern boundary of the colony,) to its source; thence cross over to the Upper Essequibo, and thus reach the range called the Sierra Acaray, the line of separation in this part of South America, between the basins of the Essequibo and the Amazonas.

6thly.—A letter from Captain Alexander, dated Cape of Good Hope, Sept. 10, stating that he had that day left Cape Town, on a journey to the Dámaras country, on the west coast of Africa, beyond the Orange River. It may be remembered, that eighteen months since Captain Alexander went to the Cape of Good Hope, with the intention of proceeding into the interior from Delagoa Bay, on the east coast, but was delayed by the Caffre war, &c.; in the mean time, Dr. Smith had returned, having explored the country to the north-eastward, at the back of Delagoa Bay; Captain Alexander, therefore, at once decided upon a new field for discovery, and has selected the Dámaras as the least known. The last missionary station is at the Warm Bath, twenty miles from the Great River; and the only account we have of the country beyond, is from the unpublished MS. of the brothers Van Reenen, who endeavoured to penetrate in that direction, but who did not reach any distance. Captain Alexander's probable route will be from the Warm Bath, on the Orange River, to Walvisch Bay, towards Benguela, and sweeping round easterly towards Lattakoo.

7thly.—A letter from Lieutenants Grey, of the 83rd Regiment, and Lushington, of the 9th Regiment, two young officers who have just gained the highest honours in the Senior Department at Sandhurst, offering their services, to endeavour to cross the whole continent of Australia from west to east, or to explore in any other direction in that country the Geographical Society might point out as the most eligible.

8thly.—An account of the new expedition to the Pacific and Antarctic Oceans, which is fitting out in the United States, to consist of a frigate of thirty-six guns, and a store ship of 560 tons, two brigs of 260 tons, and a schooner of 120 tons. The object of this truly national expedition is to examine thoroughly the Pacific Ocean, and, when the season will permit, to push as far south as practicable, to explore the unknown regions of the Antarctic Ocean.

Lastly.—The President announced from the chair, that he had the gratification to state that he had that day received a letter, mentioning that Captain Back, in the *Terror*, had been spoken with on the 1st of August in Hudson's Straits: lat. 62 degrees, long. 71 degrees. All well.

ASHMOLEAN SOCIETY, OXFORD.—Nov. 11.

The President, Professor WILSON, in the chair.

A letter was read from Colonel Stacy, in India, announcing a present to the Society of a number of fossil remains.

Professor RIGAUD delivered a paper on the *Arenarius* of Archimedes. The paper gave a general account of the contents of the *Arenarius*, of the method invented by Archimedes for the enumeration of very large numbers, and his artifice on the principle of logarithms, for finding the value of their products. It then entered on the state in which the Greek text of this treatise is now preserved to us. The first critical edition was that which Dr. Wallis published at Oxford in 1676, which is very valuable, although he had not the advantage of any manuscript to assist him, but principally depended for his authority on the imperfect text of Hervagius. Torelli, in preparing the edition of the works of Archimedes, which was published at Oxford in 1792, professes to follow Wallis, and, indeed, departs only in a very few places from what he had adopted. Torelli most probably was not aware that a much better text of the *Arenarius* had been printed in Great Britain many years previous to the completion of his own labours. The book, indeed, is very scarce, as it was never published, and only a few copies got abroad. Any one acquainted with the characters of Foulis's printing, must have immediately recognised the press at which it was executed; but it never had any regular title-page, and no particulars would probably be now known of it if Mr. Barnwell had not preserved them in a note, which he has inserted in a copy belonging to the British Museum. From that valuable memorandum we learn that the editor was Dr. Moor, Professor of Greek at Glasgow; and that he used a MS. for it, which had been lent him by the Abbé Salier, as it is said, out of the French king's library. He appears to have sent it back in 1751; but Mr. Barnwell, in 1828, could find no traces of it in that extensive collection at Paris, nor was any further clue discovered to an original authority for Dr. Moor's very superior readings, till a MS., in 1830, was left by Mr. Powell, of Balliol, to the Observatory at Oxford. In this Mr. Barnwell immediately observed a coincidence with the peculiar text of the Glasgow edition. But reasons were given in Professor Rigaud's paper for doubting whether it was the identical MS. used by Dr. Moor; and if it was, whether it had ever belonged to the Royal Library at Paris. Anderson, in his translation of the *Arenarius*, published in 1782, alludes to Dr. Moor's (which he only knew as an anonymous) edition; and, from mistaken caution, rejects the decided improvements which it affords. There is an old Latin translation which Hervagius added to his publication, although it essentially differs from his Greek text. Mr. Anderson suspected that the Glasgow edition was altered, and accommodated to this Latin, without considering (what is now indisputably clear,) that, by their agreement, one became a confirmation of the other.

Professor POWELL communicated a paper entitled "Observations on the Refractive Indices for definite Rays in various Media."

COINS AND MEDALS.—Coins may be justly esteemed the most lasting as well as the most ancient of all the monuments of antiquity. We read in Genesis that Abraham bought a burying-place for his wife Sarah, for 400 shekels of silver, current money with the merchants; and, according to Willapand, money was coined long before the flood. In some countries commerce is carried on by pieces of uncoined gold and silver of a greater or less size, according to the value of the commodities purchased, each man having his weights and scales to assay the metals. The word shekel employed by Abraham has been generally used since to signify some piece of money current among the Jews; and although it is mentioned in Genesis that Abraham weighed them, it does not follow that they were not coined pieces, since among the ancients coined money was often paid by weight. Medals were highly esteemed by the Greeks and Romans, both of whom have left some admirable specimens of this sort. Medals are more likely to survive the ravages of time than the strongest buildings which made the ancients so careful of laying medals at the foot of statues and in the foundations of temples, trophies, and other buildings; for as they foresaw the ruin of all those monuments, they depended on medals to perpetuate the memory of those things which they wished to transmit to posterity. Some of those medals which are preserved in the cabinets of the curious, not only rectify several mistakes in history, but acquaint us with many important particulars which have been omitted by ancient writers. Without these medals it would be very difficult to know the family names and surnames of many great persons, or to distinguish the functions of ancient magistrates and dignities under the emperor, whose order of succession is also chiefly known by their help, as also the time when the chief events of their reigns occurred—when colonies were established, as well as the different epochs of towns and countries. Nothing, indeed, can be of greater use than medals to rectify the errors of chronology. But for them the forms of the Greek and Latin letters, the way of writing among the ancients, their abbreviations of words, and different ways of orthography, would be almost unknown to us.

RUSSIAN AVIDITY FOR RAILWAY INFORMATION.—Thirty thousand copies of M. Gerstner's (the engineer's) first report on the Zarsk-Selo railway, we hear, were circulated in a few days after it appeared; namely, 20,000 in the Russian language, 9000 in the French, and 1000 in the English. As many copies will be printed of the second report.—*Railway Magazine*.

PROCEEDINGS OF PUBLIC COMPANIES.

WEST CORK MINING COMPANY.

A very numerous meeting of persons representing themselves to be shareholders of the West Cork Mining Company, took place on Saturday last, at the White Hart Tavern, Bishopsgate-street, for the purpose of considering the propriety of removing the present Chairman and Board of Directors. The meeting was appointed by the advertisement convening the same to be held at Salvador-house, the offices of the company, but we understood the proprietors were refused admittance by the directors. At about half-past twelve a large body of shareholders having entered the room, several voices called upon Mr. Vigers to take the chair.

Mr. NAYLER, who stated himself to be a shareholder, protested against the present meeting, which he pronounced to be illegal.

Several shareholders stated that their only object was to protect their own property. They would be happy to support the directors, if they found that they had acted properly.

Mr. NAYLER—If any opinion has been pronounced against the legality of this meeting it ought to be read. (Oh! oh!) No meeting of shareholders can be called without the authority of the chairman. (Cries of "Hold your tongue—we want none of your observations.")

Mr. AUSTEN—A number of persons have got into the room representing themselves to be shareholders who are not *bona fide* proprietors. (Hear.) I pronounce that to be a most dishonest and unfair proceeding. (Cheers.)

A Voice—You state what is untrue.

Mr. HUTCHINSON—I can prove it; and I will state one single fact. One person who represents himself a shareholder, I relieved a short time since with a sovereign out of my own pocket! (Shame!)

Mr. HAMMOND declared that he had had his shares fairly, and deprecated the conduct of those who first called a public meeting, and would now make it a private one. (Great confusion.)

Mr. FOURDRIER, the solicitor of the company, protested against the meeting as at present constituted. Mr. Vigers had thought proper to associate himself with Captain Timins, in filing a bill against the directors, to compel them to account for their stewardship. The directors were now preparing their answer to that bill, and he (Mr. Fourdrier) pledged himself to the meeting, that the directors would come out of the matter with clean hands, and have the thanks of the shareholders for what they had done.

Mr. VIGERS said, in consequence of the interruption they had experienced, he would request all those shareholders who were so previous to the 20th ult. to adjourn with him to the Old London Tavern. (Cheers.)

The meeting having been adjourned to the London Tavern, a numerous meeting of the shareholders assembled, when the names of those present were noted down. The meeting was confined to those who appeared in the books of the company as registered shareholders. According to a list submitted by the chairman, it being stated that shares had been transferred into the names of parties, since the meeting was advertised, with the view of making votes, the Act not requiring the shares to be held for any specific time.

Mr. VIGERS said, his object was now, as it had been from the first, not to enter into the legality, or illegality, of the meeting; he wanted to show the party opposed to them, what their strength was, and to show what their sense of the conduct of that party had been. They would, in the mean time, take a list of the names of the shareholders present, and of the number of their shares. Every gentleman would put in the proxies he held, whatever their number, as they were not then going to vote.

The list having been made out, it was moved, seconded, and carried, that Mr. Vigers do take the chair.

Mr. VIGERS having taken the chair, said he would give them a history of his connexion with the West Cork Mining Company. A worthy friend of his, then in the room, and he were in the country, and talking over London matters, his friend mentioned that this company was a very good one. He wrote to a friend in town, who made some inquiries into the subject, and the report was something favourable, and something unfavourable; however, he ordered him to purchase twenty shares for him. On making other inquiries, he was informed, that it was a working concern; that there was a clerk at 80*l.* a-year, and no porter at the door with a silver-headed mace (laughter); he bought thirty more shares at a premium, and he was lead along, till he stood there as the proprietor of 252 shares. He and his friend (Capt. Timins) were the largest shareholders; he believed they held between them 500 shares.—that was a very serious stake, and was quite enough to justify the line of conduct which he had pursued, which he trusted would be for the benefit of the company at large. After being elected a director on the 3d March, and attended the Boards for three or four times, as it were, learning how things stood—he found that Mr. Pike, the chairman, was the dictator of the concern; the other directors appeared like automatons, sitting there to register his decrees. He (Mr. V.) told him that that would not do for him; he demanded to see the titles of the company. He was told Mr. Moon was out of town, and the titles were locked up in a box, which was deposited at the bankers. Mr. Moon came home, and the large tin-box was produced. It was large enough to hold one hundred parchments, and he expected to have found it full, but on opening it he found only one solitary parchment, which was a transferred lease from the old Irish Mining Company—transferred from them to Mr. Wilkinson, and from him to Mr. Pike. He (Mr. V.) at once called for more documents. After calling for them week after week, at last Mr. Fourdrier waited upon him with a lease. He put the question to Mr. F., as solicitor to the company, and as a man of honour, whether the title of the company was really good? Mr. Fourdrier said, as a professional man, and as a man of honour, the title was perfect. The lease to the present company is based upon an old lease granted to the Irish Mining Company in September, 1824, for thirty-one years, at 1-12th royalty at the pit's mouth, being the one to which he had just referred; this was assigned by the Irish Mining Company in August, 1832, and it is the remainder of the original term which forms part of the present lease for sixty-one years, but at a nominal rent only of 50*l.* annually. Mr. F. pledged his professional character that the title was good. He went to the gentleman again, and demanded a copy of the lease, as a director—no objection was made; a copy was made out, but it was refused to him (hear).

A shareholder inquired when that application had been made by Mr. Vigers to the solicitor?

The CHAIRMAN believed it was about two months after he had come into the direction.

Mr. VIGERS resumed—He had subsequently ascertained, that that refusal was by order of Mr. Pike, unless he obtained the authority of the Board. Other circumstances had also excited some little alarm in his mind, which were, that there was no regular statement of the accounts, nor reports from the mines from their agent, Captain Foster. He complained to Mr. Prickett (a director of the company) of the matter, who agreed with him; and in the absence of Mr. Pike, of whom they all seemed afraid, turned to the minute-book, and showed him that some of the reforms which he wished to effect had been attempted, but to no purpose. Thus matters went on, all applications being replied to with great courtesy and suavity, but nothing really being done. Nothing of sufficient importance had yet appeared to warrant him in taking any decisive steps in opposition to the directors, but there was a growing feeling of dissatisfaction springing up. In the interim specimens were sent from the mines and quarries, cargoes were promised, and, in short, every thing was done by Mr. Pike to keep the shareholders quiet, with what views were best known to himself. At length, in the month of June, Mr. Pike having gone to the Ascot Heath races, he (Mr. Vigers) went into the office of the company, and he there found a young man posting up the books, and was much astonished to find that they were six months behind. He then looked at the book containing the list of the shareholders, and became very much alarmed when he saw the names of some gentlemen who had been most strenuous in their recommendations of the concern, having very small, almost nominal, stakes in it. That Mr. Pike, the chairman, who had represented to many now present, and who had dwelt strongly on the fact as a ground for confidence being reposed in the concern, that Lord Audley's 1100 shares were still retained by his lordship, instead of which he found that there were only 400 shares standing in his name, from 400 to 500 shares having been transferred into the name of Mr. Joseph Pike, and 95 shares having been also transferred to his brother, Thomas Pike, representing together nominally capital to the amount of 30,000*l.*; and it appeared that 500 of these shares were transferred to Mr. Pike by an interlineation in the ledger (cries of oh! shame!). It thus appeared that Lord Audley, instead of holding 1100

shares, was a holder of only 397, although it was repeatedly asserted, and even so lately as the 19th October, to Mr. Philipotts, that Lord Audley was the proprietor of 1100 shares (several voices here exclaimed that they had heard Mr. Pike say so). This must appear very extraordinary to the meeting, but it was not the less true; and so fraught with suspicion was the circumstance, that Mr. Pike has never dared to avow it publicly to the shareholders. Mr. Prickett at the moment came into the room, but he could give no explanation of the matter; and on a reference to the cash-book, he (Mr. Vigers) ascertained that not less than 17,000*l.* or 18,000*l.* had been paid to Lord Audley, in addition to the payments up to the 31st December, 1835, and that besides the 25,000*l.* he was to advance for working the mines and other expenses for three years, ending February, 1837, there was a further sum of nearly 20,000*l.* expended in the same manner, making a gross sum of 45,000*l.*, without having, comparatively, any funds to reinstate it, and to carry on the business. Mr. Fourdrier was present, but sat there without saying any thing; and Prickett seemed only anxious to explain how he had come into the concern, and how he had got fifteen shares from Lord Audley to qualify him for a directorship. Up to that period, he (Mr. V.) was not aware that the shareholders had any remedy; and certainly matters bore a very unfavourable appearance. He felt it necessary to consult with Mr. Pike, and told him it was expedient something should be done, as Lord Audley could demand his 25,000*l.* in Feb. 1837, and, if it was not forthcoming, he (Lord A.) could re-enter upon the property. That it was necessary to prepare such a report of the affairs of the concern as would impress the shareholders with a favourable opinion of it, should it be found to deserve it. These propositions were met by a variety of excuses, but, as before, nothing was done. It was then suggested, that two experienced and impartial gentlemen, acquainted with mining operations, should be sent to ascertain the real value of the property, but Mr. Pike attempted to frighten them with some story of a man who went on a similar expedition, and whose brains were knocked out by the poor Irish; and it ended in his refusing to sanction such a project. Previous to the last meeting three or four gentlemen were deputed, not as a committee, as it had been represented, but to prepare such a report and statement of the affairs of the company as would allay the fears of the shareholders, it being considered prudent not to excite any sudden alarm; Mr. Pike himself proposed that the payment of the 25,000*l.* should be postponed three years longer, without interest; and that out of the new capital, which the Act of Parliament empowered the company to raise, 10,000*l.* of the remaining 20,000*l.* should be paid in one year, 5000*l.* in the next, and 5000*l.* in the following. He (Mr. Vigers) objected to that, on the ground that if 10,000*l.* was paid out of the instalment of 17,500*l.* for new shares, they would be in the same state as they then were, without capital to work the concern. It was then suggested that the 6000*l.* or 7000*l.* remaining unpaid of instalments on the old shares, and 5000*l.* Consols, which formed the reserved fund of the company, should go to pay the first 10,000*l.* to Lord Audley, thereby leaving the 17,000*l.* for the new shares to form a fund for working the concern; and that, if the affairs of the company prospered, the next instalment might be available in the following year. Specimens were produced which were very beautiful to be sure, but unfortunately the discoveries of the company rested there. It was stated that the salaries of the Directors were to be reduced—that, in fact, they would take no money till a dividend was declared for the shareholders, and with this understanding the meeting went off quietly; a vote of thanks having been moved to the directors, for the purpose of keeping up an appearance of confidence and harmony. Under these circumstances, it was proposed to him (Mr. Vigers) that he should exert himself among his friends, and take two or three hundred of the new shares; but to this he had objected, until he saw what the other shareholders would do, always, of course, under the impression that they could do nothing better, and that it was their duty to make the best of a bad bargain. Great efforts were made to get the new capital subscribed for and paid up; but in consequence of some private information which he (Mr. Vigers) received from a friend, he declined to have any thing to do with the new shares. Things went on thus till the 13th October last, which was a board-day, the hour being nominally 11 o'clock, although it was generally later. He (Mr. Vigers) arrived at a quarter to 12 o'clock, and found Mr. Pike, Mr. Warneford, and Mr. Prickett, with the business just concluded, and on the point of getting up from the board-table. He (Mr. Vigers) sat down to read what had been done, but before he had got through it, Mr. Warneford and Mr. Prickett left the room, and he ascertained that two resolutions had been passed at what he supposed must be called, according to the Act of Parliament, a Board—the first sanctioning the issuing of bills of exchange in favour of Lord Audley to the amount of 10,000*l.*; and the second, that the books should be in the custody of the managing director, and not accessible without his permission (loud cries of shame! shame!) When he read those two resolutions, he went out and found Mr. Prickett—he was not very mild, and Pike came out to his assistance. Pike tried to soothe him, and said, "Why, Vigers, if you will only row in the same boat with us, we will make it all right; (oh, ho!) they had even gone the length of offering him a baronetcy (laughter); even Lord Audley went to his own (Mr. V.'s) house, and pledged his word as a man and a British peer, that if he would row in the same boat with him and his party, he would be protected, and that he should not lose any thing by it (hear). On the same 13th of October, immediately after that, he was astonished to see a gentleman, whose name he did not then know (he was Mr. Dalphin), who said he was sorry to hear that Mr. Pike was doing all in his power to oust him (Mr. V.) from the direction. That was the man whom he had just left—who had shown all the kindness possible. Mr. Dalphin, like an honourable man, at once accompanied him to Salvador-house, and confronted Mr. Pike. Mr. P. with all the effrontery in the world—with the greatest brass—so far from being taken aback, or in any way attempting to deny the fact, at once began to abuse Mr. Dalphin, saying, "Ah, I have long known you; you are an enemy of the concern. You are one of the gang, along with Mr. English and the others who are trying to ruin us." On the morning of the 14th October, he and a friend waited upon Mr. Warneford, and told him that the resolutions of the day before were of too serious a nature to be allowed to stand for twenty-four hours; and, unless they were rescinded that day, he would publish the circumstances of the case in every newspaper in London the next morning. He promised to go over in half an hour and do what was proper. He went to Salvador-house about three o'clock, and found neither Pike nor Warneford. He knew something of their haunts, and found these two, and Mr. Pike the auditor, in close consultation in Cundy's railway-office. They said they would be over soon and see them. He (Mr. V.) had several friends with him, and when Mr. Pike came over—for Warneford sneaked off—he began his abuse again, and said they had better leave him and Vigers alone. That was done; and then he said the resolution would be rescinded, and all would be right. Upon this assurance he went away; but he could not rest; he was in a state of the greatest agitation and uneasiness. He saw Pike, and told him of his state of mind. Pike spoke of Solari coming in—of new shares—and of great prosperity; and he asked him (Vigers), would he retire if Solari came in. He at once said certainly—any thing if you will only get me out of this scrape. Pike asked him for a letter of resignation, which was at once given, and Pike gave orders for the summoning of a Special Board, in order to rescind the resolutions—that meeting was held, and what was attended by Mr. Pike, Mr. Prickett, and Mr. Warneford; but what was his surprise when he found that all they did was to suspend the resolution for only fourteen days. He then found that there was not a word of theirs to be depended upon, and accordingly, keeping his own counsel, he took his steps; he filed a bill, had consultations with counsel, waited upon the Lord Chancellor at Wimbledon, obtained the injunction, and it came upon the parties on the Saturday like a clap of thunder. Two of the directors, Mr. Moon and the Rev. Mr. Ellis, seeing what had been going on, and was going on, had joined him in his opposition. They had now a hard task to perform, for whatever they proposed at the Board, was negatived by four to two, that was invariably the case; they were, therefore, desirous to retire, but their friends thought they were more useful where they were, so that they might, at all events, know what was going on at the Board. There were very few gentlemen present who knew that there had been three prospectuses issued of the West Cork Company; such, however, was the fact, and he had them then before him. In the two first they stated that 165,000*l.* was to be raised for the purpose of purchasing the fee-simple of the mines in question. In the last, however, there was not a word about the purchase of the mines;—they had then got the Act of Parliament, and had higher objects in view. They now proposed to raise the sum of 165,000*l.* for the purpose of

taking the lease of the mines, the fee-simple of which was not worth 90,000*l.* altogether. Well, they were to raise 165,000*l.*, and they were to pay the same sum for the lease, so that they were not to have one single shilling of capital. Yet how did they go on? What was their starting? Why they began by appointing a managing director at 800*l.* a-year, and other functionaries, whose salaries amounted to the sum of 5600*l.*; that was to be a dead weight on the concern, when they had not a single shilling of capital of their own. Afterwards there was some cutting down; but with all that, still the dead weight on the company stood at a most enormous sum, with not a shilling in the coffers. He was now about to allude to the most important point of all that he had to lay before the meeting. He held in his hand a report, from Mr. Adam Murray, which had been in the hands of the managing director, and yet he believed that no other director of the company had ever seen it, or if they had seen it at all, they had only seen garbled extracts, which suited the purposes of those who showed them. Those present would recollect, that in the *Mining Journal* some months back there was a letter—a short letter from Mr. A. Murray, and it would have been well for many of them had they paid more attention to it; some would have saved a great deal of money had they taken the advice there offered them, and refused to have paid up their shares—they could not have been compelled to do so, and others would have been spared, by refraining from purchasing shares which had turned out so bad. Well, then, when that letter appeared there was some commotion—but the parties at Salvador-house said that it had been published for party purposes—that Murray and English, and others, were scheming together, in order to get this fine property into their own hands. They were told that Mr. Williams, of Scorer, who was so anxious to obtain possession of mining property, would give any thing to be able to get into this property by any means; that it was a scheme, and could be proved beyond the possibility of a doubt, it was a scheme to oust the proprietors, and get possession of it for themselves. Mr. Williams was to have one mine, another was to have some other; and when their schemes had succeeded, the Editor of the *Mining Journal* was to have one of the slate quarries (laughter). Even his friend Samuels had not escaped; the magnates of Salvador-house said they had long known him to be an enemy of the concern, they were well aware of his hostility, he was one of the conspirators, he was in the habit of visiting at Scorer-house—that was actually the way in which they got over the more than hint which the *Mining Journal* had so kindly thrown before the shareholders, and which he was sorry had not been acted upon. As to obtaining a sight of reports, it was out of the question. Mr. Pike stood in the double capacity of agent to Lord Audley and agent for the shareholders, and the directors had their qualifications given to them. The valuation was made by Mr. Murray on behalf and for Lord Audley, and consequently was not adverse to his Lordship. The value of the fee-simple was put down at 57,614*l.* 9*l.* 9*d.* That was the value of the whole estate. For mines, quarries, &c. 20,000*l.*, and 14,700*l.* for tithes; making altogether 92,314*l.* 9*l.* 9*d.* That report was dated in August, 1833, just before this scheme was brought out. This report was in the possession of Mr. Pike, agent of Lord Audley; it was paid for by him or Mr. Fourdrier, the solicitor of the company, and his lordship's solicitor. As another instance of the way in which the affairs of the company were managed, he would observe, that although the accounts were regularly handed to Mr. Pike, they were never seen by the directors. After the legal proceedings had been commenced, Mr. Solari was elected director in the room of Mr. Jacob, who must have been under the same withering influence exercised over so many others. He had been induced to advance his money, which had travelled off to pay Fletcher's mortgage, for the sum of 2900*l.*, that being the title-lieu of one of the mortgages upon the property. He was aware that his (Mr. Vigers's) conduct had brought down upon him the bitter hostility of the directors, but he felt conscious that he had saved the pockets of the public to a large amount; he (Mr. Vigers's) had learned that the Rev. Mr. Knapp, sub-dean of St. Paul's, had been elected a temporary director. He was a gentleman of unquestionable respectability, but appeared to be under the same magic influence as others.—This gentleman (the Rev. Mr. Knapp) had actually been canvassing for votes to uphold him in the appointment. He held in his hand a letter from the Rev. Dr. Geldart, who, from his age and station, might be considered the father of the church, and also enclosed therein the copy of one which had been sent by him to the Rev. Mr. Knapp.

Copy of the letter of the Rev. Mr. Geldart, addressed to the Rev. J. Knapp.

Kirk Deighton, Nov. 16, 1836.
SIR,—By a continued repetition, up to April last, of the most flattering hopes of success of the West Cork Mining Company, kept up by the managing-director from the first prospectus, I was led on to be a large subscriber. At one time the manganese was most profitable, and at another time the slate quarry; and in the summer of 1835, a new vein of copper, found near the surface, in Horse Island, rendered no longer doubtful the immense riches of the concern. Either fallacious hopes have been held out, or disastrous management has prevailed; in either case, the shareholders are the victims. I am at length awakened from the delusions I have suffered, and alive to the misconduct of some of the directors. The first recompense Mr. Pike and the other directors are bound to make to the shareholders, is to volunteer their resignation, and then to court a full investigation of their conduct and management, proposing to abide by the result, without spending the property of the shareholders in litigation.

As a brother clergyman, I now do not hesitate to advise you not to become a candidate for a director, because the situation is incompatible with your clerical profession. If you have a doubt of this my opinion, consult the Bishop of London, your diocesan. I give this advice in kindness, and in return for the handsome manner you speak of my influence; and I sincerely wish Mr. Pike and the other directors may do themselves credit at this juncture by their resignation. (Signed) JAMES GELDART.

The letter of Dr. Geldart to himself was to the effect, that the Rev. Mr. Knapp having written to him to request his vote and interest for his becoming a director of the West Cork Mining Company, and Mr. Knapp professing his determination to support the present directors, he (Dr. Geldart) had sent him a reply, a copy of which he enclosed, as he wished that his reasons should be made known, as they furnished a sufficient ground for his present opposition to the directors (hear, hear). Dr. Geldart was quite a stranger to him, but that was not a solitary instance of strangers coming forward and tendering evidence in support of the correctness of the line of conduct he had felt it his duty to adopt.

A SHAREHOLDER begged to remind the chairman of one fact—the falsification of the accounts. (Several voices exclaimed that it was unnecessary to go into further details.)

The CHAIRMAN thought it quite useless to waste more of their time. Indeed, new facts were every hour coming to light, and it was only last night that he had been put in possession of a large bundle of papers of great importance to the interests of the shareholders.

In the course of the proceedings, a question having been put to the chairman by Mr. Thorby, as to whether the valuation of Mr. A. Murray, which stated the fee-simple of the whole estate at 92,000*l.*, had been withheld from the other directors on the formation of the company. The chairman declared unequivocally, that such he understood to be the case.

The CHAIRMAN observed, that he was every day receiving a variety of documentary evidence, and letters were forwarded to him from all quarters. He would be able to prove, satisfactorily, that it never was a question as to the granting of a lease; but, on the contrary, the first prospectus plainly stated the sum of 165,000*l.* was to purchase the estate, mines, minerals, and every thing (cheers). [Several shareholders here exclaimed that they had subscribed their money for that purpose, and with that conviction.] It was quite certain that Lord Audley would have been glad to get 110,000*l.* for the fee-simple, and he understood it had been offered for 90,000*l.*; so that, in fact, the sum of 165,000*l.* would have given his lordship 60,000*l.* over the real value of the fee-simple (hear). How then any three or four men could be found in the City of London—knowing that such a thing could not stand a single moment in a court of equity—how any men could be found with the hardihood to take in the public to the amount of 165,000*l.*, when the fee-simple was only valued at 20,000*l.* was to him (Mr. Vigers) more astonishing than any thing he had ever heard of.

The CHAIRMAN observed, that putting the 55,000*l.*, the value of the new shares, to 50,000*l.*, the value of the 1100 old ones given to Lord Audley, it was clear that 100,000*l.* was saved out of the pockets of the public by the course he had pursued. The two directors, Mr. Moon and Mr. Ellis, were then present, to whom any questions the proprietors thought proper to put, would, he doubted not, be answered by those gentlemen.

A SHAREHOLDER stated, that he had heard from good authority, though

not from Mr. Pike himself, that he had expressed the satisfaction he would have felt, if the bills had passed into the public market, to have rapped Mr. Vigers on the shoulder for them. (Cries of "shame!")

The CHAIRMAN thought that was another proof of the diabolical villainy of the party who thus wanted him to accept for the company 10,000*l.* worth of bills, and then make him personally responsible for them.

Another SHAREHOLDER—He would observe, in confirmation of what had fallen from the chairman, that when the new shares were about to be issued, he had waited upon Mr. Pike, and said, "Satisfy us that this company is as good as you state, and in three days we will get you the 55,000*l.*," but he never could get Pike to any satisfactory statement.

Mr. Moon then came forward to explain the part which he had taken in the affairs of the company, and if his conduct did not entitle him to the confidence of the proprietors, let them visit him with marks of their displeasure. He had put down upon paper the previous evening what he intended to say, and it would appear from it, that he had been as much a victim as any other person connected with the company. He thought it right to put down on paper what he had to say, as from all that had appeared throughout these transactions, he knew not whether his words might not be taken down to enable persons to prosecute him, for it had been already intimated to him, that it was their intention to "smash" him. He had consulted no professional friend upon what he intended to state, but had merely acted from the impulse of wishing to vindicate his own conduct. He was absent from London at the time the proposition was made at the Board which had called for the injunction, and had he been in London, he would not only have protested against it, but have willingly joined in the injunction, although he had been served with a copy of the injunction, so far from wishing to injure the concern, he had published a letter to that effect, a copy of which he forwarded to each of the shareholders. [This letter has been already published.] It was now right for him to state how he had become acquainted with the company, in which, between himself and friends, he was involved to the amount of between 50,000*l.* and 60,000*l.*

Captain TIMINS said, Mr. Moon appeared to be labouring under the idea that blame was attached to him, and that it was necessary he should vindicate himself. If there was any gentleman present who had any charge to prefer against Mr. Moon, let him now be heard (a pause). As there appeared to be no such idea in the minds of the shareholders present, he trusted Mr. Moon would rest satisfied with what he had already stated.

Several gentlemen explained, that no imputation whatever had been cast upon Mr. Moon.

Mr. Moon, with evident reluctance, gave way, first demanding, with much earnestness, if any charge could be urged against his honour and integrity. (The demand was followed by general cries of "No, no," and cheers.)

The CHAIRMAN said, from the habits and character of Mr. Moon and Mr. Ellis, it was very unlikely that they would be admitted behind the scenes—it was much more likely that they, with others, had been used as instruments. He would now call upon Mr. John Davis, the provincial director, who could probably make some communications of importance to the shareholders.

Mr. DAVIS felt extremely obliged to them for their indulgence, and as his name had been reflected upon, and alluded to somewhat equivocally, he thought it right to lay a brief statement of facts before them. His (Mr. Davis's) connexion with the West Cork Mining Company had long since ceased. He was no *particeps criminis*, if *crimen* there was, for he had nothing to do with the management of the concern. He had remonstrated and expostulated with the directors one after another, but he had no voice in the cabinet, never having been admitted to the privileges of a director. He had never been permitted to enter the *sanctum sanctorum*, and was a director, *lucus a non lucendo*. It was impossible for him to him to rest under the stigma of having 600*l.* a-year, for a year and a half, without having done any thing for it, and he would therefore observe, that the direction had been formed before he became attached to it. He had come in with his friend, the late lamented Mr. Ruthven, the Member for Dublin, and he would at once declare that he had never received a share for nothing. An offer of 600*l.* a-year had been made to him for his services, and he accepted it, although he felt it to be inadequate, being obliged to give up other engagements and reside in Liverpool. When it was recollected, that with a very powerful opposition, he had obtained an Act of Parliament for 360*l.*, which, under ordinary circumstances, would have cost the company 2000*l.*, he had no hesitation in saying that accounts were balanced between himself and the company. Many facts had been stated by the chairman, which were as new to him as they were to the meeting. He (Mr. Davis) had been anxious to attend the meetings of the Board, but had never been asked, for he saw the rocks upon which they were splitting, and could have helped them over the shoals. During the summer of 1835 the managing director was in Ireland, and he had remonstrated with the directors, through Mr. Ruthven, at a certain movement that had taken place at the Board. Mr. Ruthven did expostulate, and induced a gentleman, now present, to propose a resolution, in which, if he had been properly supported, there would have been no occasion for the present meeting, and the West Cork Mining Company would be placed on a very different footing. He (Mr. Davis) had been made a defendant in the injunction, although he had never received a share for nothing, and the best evidence which those gentlemen who stand forth at the eleventh hour could give of their sincerity, was to restore their shares—to give up the leaves and fishes they had got. (Hear, hear.)

The chairman had stated at the outset that there was no charge against Mr. Davis. If he had got employment at Liverpool, he had no doubt Mr. Davis would have been both active and useful; what he had complained of was, that Mr. Davis's salary was so far a security; it was given to him as a remuneration for having obtained the Act of Parliament at a comparatively small charge. What he wished to ask Mr. Davis now, was for the benefit of the shareholders, and he was satisfied he would answer it openly and fearlessly. He wished to ask him whether he knew of the report of Adam Murray, and whether he was aware of any thing that could now tend to the benefit of the injured shareholders? If he did, he (Mr. Viger's) was confident he would assist them by every means in his power.

Mr. DAVIS would pledge his honour as a gentleman, and his word as a Christian, that he had never heard of that report till the present day. He had seen extracts from reports, the impression left upon his mind by which was, that the quarries were worth 40,000*l.* or 50,000*l.*; but he never saw the report now referred to.

The CHAIRMAN: It is quite clear that certain parts of the report only were shown, but the whole was carefully kept out of the directors' sight.

Mr. DAVIS said the only time he ever went into the Board-room, he was told that the reason for his exclusion was, that he was a man of business. He had complained of that treatment, after bringing in so many friends; and further, he had complained of their permitting their very porter to have access to books which were closed to him.

A SHAREHOLDER begged to ask what Mr. Davis meant by saying, that those who joined them at the eleventh hour should give up the leaves and fishes?

Mr. DAVIS said, if these two gentlemen had stood forward with his friend, Mr. Ruthven, in the absence of the managing director, the present meeting would be unnecessary.

Mr. Moon explained, that a resolution was passed during the absence of the managing director in Ireland, that no checks should be drawn by the managing director of the company, except according to the form presented by the Act of Parliament, but on Mr. Pike's return he convened a meeting in his (Mr. Moon's) absence, and entered a resolution to the effect, that in consequence of the foregoing one being found inconvenient in cases of emergency, the managing director be allowed the privilege as before. He would conclude by observing, that were it not for the recommendation of so respectable a firm as Rivington and Fouldriner, the first solicitors to the company, he would never have been connected with the company.

The following resolutions were then agreed to:—

Resolved, 1. That Joseph Pike, George Prickett, and Richard Warneford, three of the directors of this company, have forfeited, and do not possess, or deserve to possess, the confidence of the shareholders of this company here present, and there is reasonable cause for removing, and it is expedient to remove them from the office of directors.

2. That inasmuch as by the provisions of the Act of Parliament, no power is given to the shareholders to convene a special general meeting, a requisition be presented to the directors of the company forthwith, to call a special general meeting of this company, for the purpose of removing from their

office of directors the said Joseph Pike, George Prickett, and Richard Warneford, and appointing three other directors in their stead.

3. That this meeting do approve of the suit instituted by William Revell Vigers and J. F. Timins, Esq., against Lord Audley, the said Joseph Pike, and others in the High Court of Chancery, on behalf of themselves and the other shareholders of this company, not defendants thereto.

4. That the following gentlemen, shareholders in this company, viz. Mr. Philipotts, Mr. Austin, Mr. Holborn, Mr. Patrick, Mr. John Baker, be appointed a committee to co-operate with the said W. R. Vigers and J. F. Timins in the prosecution of the said suit, and of any other proceedings which may be deemed necessary, and to act generally in conjunction with the said W. R. Vigers and J. F. Timins, on behalf of the shareholders.

5. That the shareholders now present, deeply sensible of the important services rendered by Mr. Thomas Mitchell Shadwell, the accountant of the company, hereby express their regret and indignation that his prompt and honourable conduct should have exposed him to the stigma of the managing director. (Signed) W. R. VIGERS, Chairman.

Mr. Vigers having left the chair, it was moved by Benjamin Austin, Esq., and seconded by Francis Sapse, Esq., and unanimously resolved.

6. That the thanks of this meeting be given to William Revell Vigers, Esq., for his able and manly conduct, and the integrity and exertions he has evinced for the benefit of the shareholders.

NORTH CONSOLIDATED MINING COMPANY.

At a special general meeting of the shareholders of the North Consolidated Mining Company, held at the offices, Clement's-lane, on Monday, the 21st instant.

THOMAS ASHTON, Jun. Esq. in the chair.

The advertisement convening the meeting having been read, The CHAIRMAN read the following report of the directors.

REPORT.

In consequence of the monthly samplings having fallen short, by which additional pecuniary means became necessary, the directors thought proper to convene a special general meeting of the scripholders, for the 21st inst. for that object; and in order that the directors might be in a situation to lay before that meeting the most recent and accurate information regarding the actual position of the general affairs of the company, two of the board, namely Mr. T. Ashton, jun., and Mr. D. Mocatta, were appointed to visit the county of Cornwall, to procure such information.

In virtue of this resolution, we proceeded to the county, and visited the mines, accompanied by some practical miners, in conjunction with one of the largest local scripholders, the first point of investigation being a review of all the operations then carrying on, and their consequent outlay per month.

Coals consumed by the engine, per month, forty tons, at 17*s.* 6*d.*, 70*l.*; grease, 1*l.* 5*s.* 6*d.*; oil, 1*l.* 15*s.*; lead, 3*s.*; hemp, 1*l.* 10*s.*; men's wages, 9*l.* 10*s.*; blacksmith's wages, 12*l.* 9*s.*; iron, 15*l.*; coals for smithshop, 2*l.*; timber consumed in the mine per month, 26*l.*; leather, 4*l.* 10*s.*; sawyers and carpenters, 14*l.*; pitmen and timbermen, 8*l.* 8*s.*; fillers and sanders, 19*l.*; forty-nine workmen at 5*l.* each, 245*l.*; dressing cost and carriage, 70*l.*; sundries, 10*l.*; ropes, chains, and kibbles, 12*l.*; nails, dressing tools, &c., 11*l.* 13*s.*; total, 499*l.* 3*s.* 6*d.*

Our next object was to make inquiry as to the grounds of favourable expectations, from driving so many levels, when in their prosecution so little benefit was derived, and hitherto nothing promising presenting itself. The answer was, that as a large and fine lode of copper was obtained from the upper levels by former adventurers (the backs of which principally furnished the ores we have raised for some months past), that, in sinking, there was reason to expect the lode would again be met with. It was stated, that some of the present workings (which would be accomplished by the end of the present month) would throw much light upon the subject, and prove a guide to future operations.

Our next step was to ascertain (in the event of the actual expenditure being considered by the scripholders as too large) what promise the upper levels, and the shafts and winzes (some throwing up good gozsan) now sinking and driving, held out, and the outlay that their development would occasion. And after carefully going through every item of charge (assisted as before stated), the following calculation was the result, per month, viz.:—Engine cost, 50*l.*; smiths' cost, iron, &c., 30*l.*; twenty-six workmen, 130*l.*; timber, &c., 25*l.*; leather, &c., 4*l.*; carpenters, &c., 14*l.*; pit and timbermen, 8*l.*; filling and landing, 10*l.*; ropes, chains, &c., 20*l.*; salaries, 21*l.*; sundries, 10*l.*

Total £320 0 0

Say 100 tons ores, at 4*l.*..... £400 0 0

Tribute and dressing cost, 11*s.* 220 0 0—180 0 0 adventurers' part.

£140 0 0 loss per month.

We found the Flat-rod engine-shaft forked to within five fathoms of the old workings. Every exertion being made to drop the lower lift, which was in course of operation, so that the mine may be expected to be in fork by the end of the present month.

It may naturally be asked, why this important point had not been attained before this? It is accounted for by the following circumstance:—

Immediately after the resolution of the proprietors of the 17th December, 1835, "to erect flat-roads, and work the western part of the mine," &c., application was made to the agent of the Bissoe Bridge Mining Company (whose mine, Wheal Clifton, adjoins our western sett), to participate with us in a fair proportion of the water charged, contingent on, and for the unwatering their mine; but as this negotiation, although frequently renewed, ultimately failed, a considerable expense, with loss of time, has been occasioned by the necessity of damming off their water down to the thirty fathom level, and which has been effectually done.

We obtained satisfactory evidence of the ability of Captain Tippet, and of his indefatigable exertions in superintending the operations on the mine, frequently remaining all night on the premises.

In conclusion, we have only to observe, that in order that the scripholders might have the opinion of an eminent mining captain, we have appointed Captain John Richards, of the Consolidated Mines, to make an inspection, and duly to forward his report. Captain Hensley, also of the Consolidated Mines, has very recently inspected the mine, on behalf of Messrs. S. and R. Davey, of Reduth, and those gentlemen will, no doubt, favour the meeting with his opinion. Captain Nicholas Vivian has also inspected the mine, by the request of a respectable scripholder of London; and as Captain Vivian has furnished us with a copy of that report, we think it right that his report should also be submitted.

THOMAS ASHTON, jun.

D. MOCATTA.

FINANCIAL STATEMENT TO THE END OF DECEMBER.

Dr.	£ s. d.	Cr.	£ s. d.
Bills payable, due this month	49 8 3	Cash at the banker's	436 8 4
Do, due in December	125 10 4	Bills due 29th Nov.	205 11 10
Merchant's bills previous to October, not yet drawn for	150 2 3	Do, for ores sold	492 16 8
October cost	485 1 3	Do, for 111 tons to be sold on the 24th inst., calculated at	300 0 0
Merchant's bills 220 8 3	703 9 8	Balance against the Co.	223 18 8
November cost (including merchant's bills), calculated at	600 0 0		
	£1628 10 6		£1628 10 6
Balance against the Co.	£ 223 18 8		

Reports from several mining captains and agents of mines who had been called in to report upon the workings, were then read.

A letter was also read from Messrs. S. and R. Davey, the lords of the mine, wherein they expressed their willingness to defer taking dues on the produce of the mine for six months.

Several questions were then submitted to the chairman, having regard to the working of the mine at a reduced rate, and also to its prospects generally—the answers given to which afforded satisfaction to the proprietors.

It was then moved by DANIEL WILKINSON, Esq., and seconded by JOSEPH ALLEN, Esq., that a further payment of 2*l.* per share be made in the following manner, viz. 10*s.* per share this day, and 10*s.* per share on the 21st December next; the same to be paid into the company's bankers, Messrs. Barclay, Bevan, and Co., within thirty days from those respective dates; and the remaining 1*l.* per share to be called for at the discretion of the directors, in two instalments of 10*s.* each; which resolution was carried unanimously.

It was then moved by H. DE CASTRO, Esq., seconded by ANDREW COHEN, Esq., and carried unanimously, that the thanks of the proprietors are due, and are hereby given to the directors for their services.

Thanks having been voted to the Chairman, the meeting adjourned.

TORPEDO.—M. Matteucci, by aid of new apparatus, has succeeded in magnetizing needles with the fluid produced by the torpedo, and even to elicit sparks from this fish which may be seen during the daytime.

Fossil INFUSORIA.—M. Chretien Fischer, proprietor of the porcelain manufactory of Pirchen Lammer, near Carlsbad, has sent to M. Ehrenberg, professor at Berlin, some fragments of a silicious deposit, contained in the turf-pits of Franzensbad, in Bohemia, in order to ascertain the species. M. Ehrenberg confirms M. Fischer's supposition, that this deposit was made by the effects of subterranean fire, and recognises the shells of the *Navicula* and the *Bacillaria*, the former belonging to the *N. viridis*, which proves that it was a bed of fresh water instead of that of the ocean, according to the opinion of M. Fischer.

MR. CROSSE'S NEW ELECTRO-MAGNETIC APPARATUS.

The following letter on this interesting subject has been addressed to the editor of the *Merthyr Guardian*:—

SIR,—I have done myself the pleasure of enclosing to you two specimens in elucidation of the experiments of Mr. Fox and Mr. Crosse. The one is a proof of the presence of the yellow sulphuret of copper under the grey sulphuret, accompanied by crystallization of quartz, which, from their position, appear to have been formed by voltaic currents perpendicular to the magnetic meridian; and the other a beautiful instance of the non-completion, by nature, of a perfect specimen of quartz, from the insertion, in a transverse direction, of another and similar formation. These quartz are formed upon a group of crystals of the yellow sulphuret of copper, and constitute one of the most beautiful specimens of the kind I have ever seen from Cornwall.

Trusting to memory, and writing in considerable haste, I had some doubts of the correctness of one extraordinary fact mentioned by Mr. Crosse, namely, the singular circumstance of the forces of his galvanic battery being at their greatest maximum between the hours of seven and ten in the morning; but the accompanying letter, addressed by that gentleman to the proprietor of the *Atlas*, not only bears out the assertion, but states most especially that this takes place without the interference of any "barometrical, thermometrical, hygrometrical, or electro-metrical" influence whatever. It appears that Mr. Crosse is now fitting up, after the manner described in his letter, a battery to consist of 1550 pairs of cylinders. What may be the effect of the completion of this gigantic apparatus, or of the influence of the same principle carried to a yet greater extent, it is impossible to anticipate. Matter, which we now consider as elementary, may probably, by its astounding powers, be decomposed; and elements be combined to form other and valuable substances as yet unheard of. The costliest gems and metals may, by its aid, be manufactured, and chemistry receive into its science the realization of the fondest dreams of its professors. Its operation on the various gases will unquestionably lead to the most important discoveries, and the application of the numerous formations it will give birth to, for rendering these formations cheaper and more accessible to the arts, will, it is hoped, fully answer the *Cui bono?* of those who have hitherto considered the subject fitted for the laboratory alone, unaccompanied by any practical or profitable result. Feeling obliged by your publicity of these few remarks, and trusting they will tend, in some degree, to excite a desire of inquiry among those who have hitherto treated the subject but lightly,

I remain, Sir, your very obedient servant,

Newport, Oct. 21, 1836.

E. L. RICHARDS.

"Broomfield, near Taunton, Sept. 23, 1836.

"DEAR SIR,—* * * I will not enter into this subject at present; any more than to say I am now heart and soul engaged in a tedious but interesting series of experiments on the voltaic battery, more especially on its long-continued action, with respect to its powers both of ignition and crystallization, as well as other very important phenomena connected with the subject.

"In the formation of these batteries I make use of the cylinder shape, each pair of zinc and copper cylinders being separately insulated by standing on a glass plate. I reject acids, and fill the cylinder with common water. I found, at the end of a twelvemonth; no sensible diminution of the power of a battery composed of five hundred pairs of cylinders; and on taking the battery to pieces to examine the effect produced on the zinc, was surprised to find that no oxidation injurious to the zinc had taken place, although that metal was in the state of their sheet.

"As the water evaporates in the cylinders I generally fill them once in six weeks. It is curious to observe that every morning, between the hours of seven and ten, these batteries evince a much greater electrical power than at any other period of the day; this effect is entirely unconnected with variations in the barometer, hygrometer, thermometer, electrometer (atmospheric), or any other meter whatever. In consequence of their more perfect insulation, these batteries possess a much greater power than any others made on a different plan with water alone, and by connecting the opposite poles with the outer and inner coating of a common electrical battery, a constant and never-failing stream of electric fluid is produced. Eight hundred pairs of cylinders, each four inches high and two and a half diameter, will discharge brilliantly metallic leaves and tin-foil, fuse the edge of stout silver sheeting, melt off the point of a penknife, fire gunpowder, and give a strong shock to the human body.

"On receiving this shock with the knuckles of the fingers, the skin is actually cuterised, as if touched with a hot knitting needle, accompanied with a strong smell of burnt skin. It is not possible within the compass of a letter, and that hastily sketched, to do more than just glance at the subject. I am fitting up a battery to consist of 1550 pairs of cylinders, as I find the increase of numbers to produce more than a corresponding effect in power.

"Were it in my power I would construct an apparatus so extensive as to give an experimenter some chance of unlocking the gates of science.

"You are at liberty to publish this letter, or any part of it, if you think it worth while, and believe me,

Dear Sir, yours truly,

ANDREW CROSSE."

TO THE EDITOR OF THE MERTHYR GUARDIAN.

SIR,—Mr. Richards has favoured the scientific portion of your readers with some accounts of Mr. Crosse's experiments; and, as a lover of science, I return my thanks to him for his interesting letters, and to you for publishing them. Local papers should possess other sources of interest than politics; and I believe many country newspapers would be filed and valued, were they to consider man's benefit, rather than man's feelings or passions. But to the main purpose of my letter: perhaps Mr. Richards, through your paper, would, for the satisfaction of several, be enabled to answer the following points respecting Mr. Crosse's battery:—Mr. C. says, "In the formation of these batteries I make use of the cylinder shape, each pair of zinc and copper cylinders being separately insulated by standing on a glass plate." Am I to understand, that each cylinder has a bottom similar to a cup, or that a copper cylinder holds a zinc cylinder; as in experiments on electro-magnetic rotation, where we have a double cylindrical vessel of copper with a bottom of the same metal, and a cylinder of zinc introduced between them? Again, if distinct vessels, how are they connected? or, if within each other, does the copper one join the zinc of the other, as in the battery of Mr. Hart, of Glasgow? Also, what size are the glass plates on which the cylinders stand? I am, sir, your obedient servant,

Bryn Sif, Swansea, Nov. 1.

ROBERT BYERS.

ON THE EXTRACTION OF COPPER FROM POOR ORES, AS PRACTISED SUCCESSFULLY IN GERMANY.—This process was first suggested by M. Karsten's observations in his "System of Metallurgy," in which he says:—"Very poor ores of oxidized copper, which could not be brought with advantage to the furnace, may be roasted, if mixed with pyrites of iron, or submitted in any way to the action of sulphuric acid gas, and will then form sulphates under the influence of the humidity of the atmosphere, or with water. Another method of extracting from similar ores, or even from the refuse or scoria is employed at Rheinbreitenbach; and consists in mixing the old scoria of copper with old ores, and placing them in frames or boxes with numerous small holes in the bottom. A mixture of nitrous and sulphurous gas is injected into the centre of these boxes, with steam at certain intervals. As soon as the sulphuric acid is formed, it acts upon the metallic oxides by producing vitriol and copperas; besides which, the sulphuric acid alone acting on the oxide of copper, a sulphate of this metal arises, which is speedily transformed into a sulphate, and the metallic salts being separated in the usual manner, they are again concentrated, and the copper is precipitated with heat by means of old iron; the copper thus obtained is afterwards mixed with flour of sulphur, then heated in a reverberating furnace; the result is the formation of sulphate of copper, which being dissolved with water and crystallized, is fit for the purposes of commerce. The liquid from which this copper is procured, is used for obtaining sulphate of iron."—*Annales des Mines*.

APPLICATION OF TANNATE OF GELATIN TO TAKING CASTS FROM METALS.—This substance is obtained by adding a decoction of galls, sumac, oak-bark, or other substance containing tannin, to a solution of glue or isinglass, in water. It is fibrous and nearly insoluble. When exposed to the air in thin layers, it hardens. When moist, it is elastic. The substance which was found to give the best mixture for casts, was finely-pulverised slate. Silica, emery, &c., give pastes which harden, and may be used for razor-strops. In making casts of the mixture of tannate of gelatin and pulverised slate, it must be left for a certain time in the mould, in order to preserve the impression. If, however, it is allowed to remain there too long, it adheres strongly. The only difficulty in the application is to ascertain the precise time required for the hardening. This substance may replace bronze in ornaments, papier-maché, card-work, &c.—*Jour. Connaiss.*

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